Understanding Public Response to Disasters

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I'm going to discuss briefly what can be learned from the study of actual technological or natural disasters, with an eye to what can be learned for preparation for potential biological weapons release. These conclusions are necessarily speculative and subject to the limitations of these data.

First, a quick overview is in order. I want to do three things in this presentation. I will first describe in broad terms the results of a comparative study of 10 natural and technological disasters that we undertook at Texas A&M University some years ago. Second, I will draw out the implications of this reasoning for bioterrorism research. Third, I will state up front the essence or theme of my remarks: Despite the temptation to think about preparation for biological weapons release solely in professionalized terms, it would be a terrible mistake to ignore or underestimate the role of the public. In fact, I think there has been a relative lack of attention to the role of the public in all of this during our discussions, with some notable examples. I argue that what the public does, what the lay public does, both individually and collectively, will make the greatest difference in the ultimate outcome.

In a 1984–1994 study funded by the National Science Foundation, we performed a comparative analysis of 10 events (Table 1). We had a quick-response team, including an engineer, to examine the built environment. We enlisted social scientists, epidemiologists, and survey researchers to look multidimensionally at the various response processes in mass casualty events to try to get a sense of the general patterns. The goal of this multidisciplinary study was to learn about prehospital care, hospital-based care, characteristics of buildings and structures and the difference they made, and the role of victim response. This was a rather unique study at the time. In fact, very few people, at least university-based researchers, actually studied empirically the response to mass casualty events.

The events included in the study were both large and small events, natural and technological events, and what I would call single-site versus multisite events, a distinction that I will discuss later. In all of the events we studied, the common refrain, from an epidemiological point of view, was that it was a miracle more people weren't killed: the World Trade Center bombing, 6 people killed; the Loma Prieta earthquake, 62 killed; Hurricane Andrew, 34 killed. I

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can still remember the day I drove down into the Homestead, Florida area and witnessed the degree of devastation to the built environment, the residential communities. I was absolutely astonished that, given the numbers of people who we estimate to have been in Homestead that night, there were only 34 casualties. The common story behind each of these events is that victims respond to these events resourcefully and collectively in a way that mitigates disaster and in ways that surprise people.

Now to the five main lessons that I think we learned in the context of this study. First, disaster planning doesn't always go as planned:

Lesson 1: Disaster Planning Does Not Go as Planned

- 1. Formal response systems often break down;
- 2. Planning for the wrong needs;
- 3. Disaster drills without externalities;
- 4. Example: US Air Flight 405, LaGuardia Airport.

Disasters are not chaotic, but things don't usually go as planned. Formal response systems tend to break down. Communication systems notoriously fail. Plans are not implemented in the expected way. Dr. Rubin's remarks regarding hospitals not functioning within the system were substantiated repeatedly. Now this is not always a bad thing. When we do top-down planning, we tend to set up overly rigid planning frameworks, and sometimes it's better that hospitals and individual emergency medical system (EMS) personnel, and so on, improvise, because sometimes that emergent flexibility can be very useful.

There is a tendency to plan for the wrong things. In most disaster drills, particularly in community hospitals, we tend to prepare for a lot of heavy trauma. That's what we expect, and that's what we plan for. In our experience, the vast majority of injuries after disasters are minor. Disasters tend to be, for the most part, primary care events. With Hurricane Andrew, more people were injured in clean-up than during the actual event itself. Although all hospitals and emergency systems (e.g., EMS) conduct disaster drills, they don't usually include the externalities to make real disasters challenging. So drills are rarely done when the staff isn't expecting them, at night, during bad weather, or when vital personnel are on vacation. Drills rarely are designed to include communications failures, and this is one recommendation that comes out of our study: You need to prepare for communication failures because they are almost ubiquitous. In addition, drills don't take advantage of the fact that the hospital infrastructure and the personnel are often directly impacted by the event itself.

Drills tend to be mandatory for nursing staff and house officers, but I'm not speaking here of Top Off and the high-visibility drills. However, in exercises in smaller places, the senior medical staff tend not to go. As a result, the disaster event occurs, and so does the typical convergence on the hospital: Here come the psychiatrists and all of the various other personnel who hear about the disaster and converge on the hospital. The medical director of the facility takes command in the emergency room but has not been to the exercises and doesn't know the procedures, and things get rather mixed up at that level.

An example of this is the crash of US Air Flight 405 at LaGuardia Airport in March 1992. In that event, they had done a disaster drill one year earlier of a similar event, exactly in the same location that the plane skidded off the runway. However, in the drill, there was no traffic because people weren't flooding to the airport on news of the air crash. In fact, on the day of the event, the incident commander needed 2.5 hours to get to the airport because of traffic. They didn't anticipate that. The actual event occurred at night, so when the first-responders got to the plane they tried to radio back to the EMS commanders but

Table 1. Mass Casualty Incidents Studied

Location	Event	Date	Fatalities/Injuries
1. Loma Prieta, CA	Earthquake	Oct. 1989	62/3757
2. Lugoff, SC	Train derailment	Mar. 1991	8/63
3. LaGuardia Airport, NY	Plane crash	Mar. 1992	27/24
4. Brenham, TX	Natural gas explosion	Apr. 1992	3/18
5. Guadalajara, MX	Underground gas explosion	Apr. 1992	200+/1400+
6. Dade Co., FL	Hurricane Andrew	Aug. 1992	34/1400+
7. World Trade Center, NY	Bomb explosion and fire	Feb. 1993	6/1042
8. Tulsa, OK	Tornado	Apr. 1993	7/143
9. Mobile, AL	Train derailment	Sept. 1993	47/181
10. Northridge, CA	Earthquake	Jan. 1994	58/9200+

couldn't tell them where on the runway exactly the plane was because it was dark, and they had always drilled during the day. So it's a reminder of the idea that exercises need to think about externalities, and that there will always be limits to what can be learned from these exercises.

Lesson 2: Victims Respond with Collective Resourcefulness

- 1. "Yellow tape" effect;
- 2. Emergent collective behavior;
- Example: gasoline explosions in Guadalajara, Mexico.

Mistrust of the public's ability to participate effectively in EMS response is widespread. Disaster planning has tended to emphasize centralized high-tech Disaster Medical Assistance Teams (DMAT), Urban Search and Rescue Teams (USAR), and other kinds of highly professionalized groups. The result is that professionals treat the public as an unwanted nuisance, as part of the problem. I call this the yellow tape effect. In other words, EMS personnel tend to try to establish a kind of physical and psychological perimeter around an event demarcated by that famous yellow tape. This is supposed to be a fence keeping the public out. Although this is overall a useful and functional strategy in a typical emergency, in a disaster, when by definition the resources and capacities of local formal EMS responders are insufficient to handle the needs of the problem, then this yellow tape phenomenon becomes a tremendous difficulty because it relegates the public and the lay bystander to a secondary role. Overall, the evidence suggested that victims tend to respond effectively and creatively. What we saw repeatedly in disasters was that victims formed spontaneous groups that have roles, rules, leaders, and a division of labor. This is the phenomenon of emergent collective behavior talked about extensively in the literature on the social science side.

This makes it possible for ordinary citizens to do extraordinary things. For example, in the tremendously violent sewer explosion in Guadalajara, Mexico, leveling 5,000 homes, citizens formed search and rescue teams that performed in amazing ways. They used automobile jacks to lift rubble and garden hoses to force air into voids where people were trapped. The majority of people were rescued by ordinary folks and not by the military, the Red Cross, the Green Cross, and so on.

Incidentally, there was a high degree of cooperation between civilians and formal EMS responders, something that would be less likely in the United States.

Lesson 3: Panic Is Rare

- Exception: fire where strangers are trapped (Coconut Grove);
- 2. Example: World trade center bombing;
- 3. Panic after bioterrorism?

The literature and our study show that panic is relatively rare. There's a lot of talk about panic, and there's a general assumption that the public would panic in a bioterrorism event. My question is, where does the data come from to support that? In the events we studied, we were amazed to interview victims and health care workers who commented repeatedly on the absence of panic, complaints, or irrational behavior. Many emergency department workers said, "Gee, I wish things worked this smoothly all the time." Most people talked about an eerie feeling of calm that came over people during life and death moments. Panic happens in disaster movies but typically not in real disasters for reasons that probably are based in evolution. What we witnessed is that ordinary citizens are amazingly capable of avoiding deadly harm. One exception to this rule that we found involves strangers entrapped in a fire, for example, the Coconut Grove Night Club fire in Boston in 1942. In that event, 491 people were killed.

Knowing that, the one event that we've studied that we figured would have incited panic was the World Trade Center bombing. Thousands of people stuck in these vertical columns, these stairwells. They were dark and filled with smoke. There was no sound. We figured this was a recipe for panic. If we were going to see panic anywhere, it would undoubtedly be here. It took people hours to get out of these buildings because they were stuck in this vertical column of victims trying to get out.

On the basis of observations, random sample interviews of 415 people who were in those stairwells, and other data, we found that panic was actually quite rare. In general, people said that there was relatively little panic and that everyone was generally cooperative. We speculated that people entered these stairwells in strata, people who knew one another, because they entered the stairwells in their work groups. This is one of the lessons that we learned: Preexisting personal knowledge of one another, being in a situation with people you know, inoculates against panic and dysfunctional behavior.

The question of whether there would be panic after a bioterrorism event is very complicated, and I don't claim to know the answer. However, the historical record on the 1918 pandemic in general does not bear out projections of panic. In addition, whether or not groups or individuals panic may have more to do with what we, the professional community, do in the way of preparing and providing information to them than any inherent tendency within the public. I think in general our tendency is to withhold information too long for fear that it will cause panic when, in fact, it's the absence of information that is most likely to cause panic. This is a very complicated issue, and I'm not trying to oversimplify it.

Lesson 4: The Majority of Lives Will Be Saved by the Public

- 1. The golden 24 hours?
- 2. EMS often arrives late in multisite events;
- 3. Example: Loma Prieta and the Nimitz freeway collapse;
- 4. The public are the "first responders."

The majority of lives will be saved by the public. In disasters, we used to talk about the golden 24 hours with respect to earthquake response in particular. In our findings, most people who died did so very, very quickly. Those who were going to be saved were injured in a minor way, and the vast majority of injured people were rescued by bystanders and not formal EMS providers. Now, again, I'm referring to earthquakes, hurricanes, and so on, when the EMS gets very disrupted, and to multisite incidents.

The dominant pattern is that EMS professionals tend to arrive late to multisite events, because of disruptions, communication, traffic, and other kinds of problems. Take, for example, the Nimitz Freeway collapse during the Loma Prieta earthquake. We studied that event quite extensively. The EMS response was slow. They were receiving 911 calls by the thousands. The 911 system is not set up for disasters. It's very difficult to prioritize when you have literally thousands of calls coming in simultaneously. How do you triage the incoming calls, from a 911 perspective, during a disaster? There were about 150 people on the Nimitz Freeway. About 50 people were killed instantly or relatively quickly; about 50 people walked away from the scene on their own; and about 50 were rescued. Of those 50 who were rescued, 49 were rescued by lay bystanders, workers in an industrial facility below the Nimitz Freeway. These people did amazing things such as making backboards out of road signs. Then they waited several hours for EMS to finally arrive. You may remember that one person who was excavated by EMS. It was widely televised by CNN. However, of course, by the time the EMS arrived the majority of people had been rescued.

Lesson 5: Social Factors to Be Considered in Planning

- 1. Rumors fill the information gap;
- Trust;
- 3. Preexisting social relationships;
- 4. Turf battles.

Other social factors have to be considered, trust being one of them. People will go where they trust health care facilities, especially in a disaster situation. The truth is that we tend to assume that people are going to go to the Veterans Administration Hospital or these tertiary care hospitals, when indeed they tend to trust local hospitals more.

Rumors will fill the information gap. Sometimes these rumors are conspiratorial, sometimes very destructive. Whether or not these rumors are destructive will will depend greatly on how, when, and from whom we release information.

The press problem has been discussed previously. One theme is the characteristics of preexisting social relationships, which tend to be very important and ought to be considered.

Implications for Bioterrorism

- 1. Victims will self-transfer and self-triage;
- 2. Anticipate "emergent" systems;
- 3. Hospitals will not be sufficient;
- 4. Home care will be necessary in a massive event;
- 5. The public response will shape the extent of the epidemic through patterns of evacuation, help-seeking, collective action, rumoring, and volunteerism.

First, victims will self-transfer and self-triage. There will be no perimeter, for the most part, for an event of this type. The boundaries of the event will be permeable. People will come to the hospital on their own. Of course, what will happen is what happens in all disasters of this type. The emergency rooms tend to fill up with the least severely injured in the initial stages, because it takes the more severely injured people longer to get there. This factor needs to be a consideration when planning.

Second, if there is a mantra that we learned from our study, it's that we need to anticipate that emergent systems will arise and to plan for what people are going to do rather than what they are supposed to do.

Hospitals will be heavily stressed. If we have 100,000 casualties and 3,000 hospital beds . . . well, you do the numbers. I think there is a strain or a thread of denial that runs in our thinking. If there's a massive event,

it's not simply going to be a matter of moving people to other hospitals or a matter of developing clinic relationships. Home care and other kinds of models, as occurred in 1918, are going to have to be seriously considered. The public response will shape the extent of the epidemic through patterns of evacuation, self-help, collective action, and rumoring.

How to involve the public?

- 1. Public service announcements (before);
- 2. Public communication strategy (after);
- 3. Pocket-sized personal protective equipment (PPE) for the public;
- 4. Civic organizations (churches, corporations, neighborhoods);
- 5. Collaboration with media (radio, TV);
- 6. Train EMS workers to work with the public.

How do we involve the public? We form partnerships with them. How do we do that? It can be done through public service announcements. Why not? We need a public communications strategy, a strategy for what it is we're going to do if an event occurs and we need to notify the public. That would have to be very clearly considered. That is going to be one of the most crucial

features of response to this kind of thing. Excuse the alliteration: pocket-sized PPE for the public. We need to decentralize the capacity for response and to work with civic organizations, churches, neighborhoods, and corporations. These are the organizations people trust. This is where people live and reside, and these organizations can be mobilized as a kind of infrastructure, a scaffolding around which the public can participate.

We need to collaborate with the media. The hero in Hurricane Andrew was a radio announcer on an AM talk show to whom everyone in Homestead listened. This fellow, rather amazingly, told people to get into their bathtub and then cover themselves with a mattress. He saved more lives than anybody. We interviewed many victims and went to many sites where homes used to exist. In many cases, what we saw was a bathtub with a mattress over it. The people spent time during that hurricane with their AM radios, listening to the disk jockey, who talked them through the ordeal. As much as we talk about the press being a potential difficulty, we need to also see them as potential allies.

Finally, we need to train EMS workers to cut the yellow tape in a disaster and to be trained to work with the public and not see them in some sort of adversarial function.